**The Effect of Nutrition on Mental Health Development**

**BY**

**NTUL, PRECIOUS AKONG**  
**ST/CST/BC/HND/21/037**

**SEMINAR (STH 425)**

**SUBMITTED TO THE DEPARTMENT OF CHEMICAL SCIENCE TECHNOLOGY, SCHOOL OF SCIENCE AND TECHNOLOGY, FEDERAL POLYTECHNIC, MUBI.**

**JULY, 2023**

**DECLARATION**

I declare that this seminar entitled “**The Effect of Nutrition on Mental Health Development**” was carried out by NTUL, PRECIOUS AKONG with the Registration number ST/CST/BC/HND/21/037 of the department of chemical science technology, Federal Polytechnic, Mubi. All information derived was dully acknowledged and referenced.

   
**NTUL, PRECIOUS AKONG \_\_\_\_\_\_\_\_\_\_\_\_\_**

(ST/CST/BC/HND/21/037) SIGN/DATE

**Introduction**

The connection between nutrition and mental health is a multifaceted relationship that has garnered considerable interest among researchers, healthcare professionals, and the general public. Nutrition encompasses the intake of essential nutrients that sustain physiological functions, while mental health pertains to the emotional, psychological, and social well-being of individuals.

From a young age, we’re taught that eating well helps us look and feel our physical best. What we’re not always told is that good nutrition significantly affects our mental health, too. A healthy, well-balanced diet can help us think clearly and feel more alert. It can also improve concentration and attention span. Conversely, an inadequate diet can lead to fatigue, impaired decision-making, and can slow down reaction time. In fact, a poor diet can actually aggravate, and may even lead to, stress and depression. One of the biggest health impairments is society’s reliance on processed foods. These foods are high in flours and sugar and train the brain to crave more of them, rather than nutrient-rich foods such as fruits and vegetables. A lot of the processed foods we eat are highly addictive and stimulate the dopamine centers in our brain, which are associated with pleasure and reward. In order to stop craving unhealthy foods, you’ve got to stop eating those foods. You actually start to change the physiology in the brain when you pull added sugars and refined (Grosso *et al*., 2021).

**Impact of Nutrition on Brain and Mental Health**

There is a direct relationship between the foods we eat and the functioning of our brains. Proper, healthy nutrition can benefit the brain in several positive ways. A healthy diet can increase the production of new neurons, a process called [neurogenesis The process by which new neurons are formed in the brain.](https://kids.frontiersin.org/articles/10.3389/frym.2021.578214#KC3). What we eat can also affect the [synaptic plasticity The ability of the connections between neurons to become stronger or weaker over time](https://kids.frontiersin.org/articles/10.3389/frym.2021.578214#KC4)  of the brain. Synaptic plasticity is simply a measure of the number of connections between neurons. The more the connections between neurons the better they can communicate, and the better we can learn, think, and memorize.

Recent studies have highlighted the influence of nutrient intake on cognitive function and brain health. A meta-analysis by Vercambre *et al.* (2022), found that higher intake of vitamins C and E, carotenoids, and omega-3 fatty acids was associated with better cognitive performance and a reduced risk of cognitive decline in older adults.

The gut-brain axis has emerged as a key factor in the relationship between nutrition and mental health. A recent study by Valles-Colomer *et al.* (2021), demonstrated that certain gut bacteria were associated with depression and anxiety, highlighting the importance of a balanced diet to support a healthy gut microbiota and improve mental well-being.

Omega-3 fatty acids have been extensively studied for their potential in managing mood disorders. A recent systematic review and meta-analysis by Bloch *et al*. (2022), revealed that omega-3 supplementation was associated with a reduction in depressive symptoms, particularly in patients with major depressive disorder. Nutritional status has been shown to influence stress resilience and mental well-being. A study by O'Neil *et al.* (2022), demonstrated that a higher intake of fruits and vegetables was associated with lower stress levels and improved mental health outcomes in a large population sample.

**Some nutrients and their effects on brain development and mental health**

Nutrition plays a fundamental role in shaping brain function and mental health. The brain is a metabolically active organ that requires a steady supply of nutrients to support its complex functions. Recent research has provided compelling evidence for the profound impact of nutrition on various aspects of brain health, including cognitive performance, mood regulation, and the prevention of mental health disorders.

**Omega-3 Fatty Acids**

**Effect on Brain Development:** Omega-3 fatty acids, particularly docosahexaenoic acid (DHA), are essential for brain development and neuronal membrane formation, especially during pregnancy and early childhood (Grosso *et al.*, 2021).

**Effect on Mental Health:** Omega-3 fatty acids have been associated with improved mood, reduced risk of depression, and potential benefits in the management of certain mental health disorders (Grosso *et al.*, 2021).

**Folate (Vitamin B9)**

**Effect on Brain Development:** Folate is crucial for neural tube development during pregnancy and influences early brain development (Huang *et al*., 2021).

**Effect on Mental Health:** Folate plays a role in neurotransmitter synthesis, including serotonin, and has been linked to a reduced risk of depression (Huang *et al*., 2021).

**Vitamin D**

**Effect on Brain Development:** Vitamin D is involved in brain growth and maturation, and its deficiency during pregnancy may impact neurodevelopment in the offspring (Ghajar *et al.*, 2021).

**Effect on Mental Health:** Vitamin D has been linked to mood regulation, and low levels have been associated with an increased risk of depression and other mental health disorders (Ghajar *et al.*, 2021).

**Iron**

**Effect on Brain Development:** Iron is essential for oxygen transport and myelination in the developing brain, crucial for cognitive development (Park *et al.*, 2022).

**Effect on Mental Health:** Iron deficiency has been linked to impaired cognitive function, poor concentration, and mood disturbances (Park *et al.*, 2022).

**Zinc**

**Effect on Brain Development:** Zinc is essential for neurodevelopment, synaptic transmission, and neuronal plasticity during critical periods of brain growth (Swardfager *et al*., 2022).

**Effect on Mental Health:** Zinc deficiency has been associated with depression and other mood disorders (Swardfager *et al*., 2022).

**Magnesium**

**Effect on Brain Development:** Magnesium is involved in neurogenesis, synaptic plasticity, and neurotransmitter regulation during brain development (Ebv *et al*., 2022).

**Effect on Mental Health:** Magnesium deficiency has been linked to anxiety, depression, and sleep disturbances (Ebv *et al*., 2022).

**How Nutrition Affects Social and Emotional Development**

Social and emotional development is a complex process that encompasses the ability to understand and manage emotions, form positive relationships, and interact effectively with others. Nutrition plays a vital role in shaping these aspects of human development. Recent research has shed light on the impact of nutrition on social and emotional development, highlighting the importance of a well-balanced diet in fostering healthy emotional expression, empathy, and social skills. This article explores recent insights and evidence on how nutrition influences social and emotional development in individuals across the lifespan.

**Early Nutrition and Emotional Regulation**

During early childhood, optimal nutrition is crucial for brain development and emotional regulation. Adequate intake of essential nutrients, such as omega-3 fatty acids and B vitamins, has been linked to improved emotional processing and decreased emotional reactivity in young children (Khan et al., 2021). Conversely, nutritional deficiencies during this critical period can lead to developmental delays and an increased risk of emotional difficulties.

**Nutrient Intake and Social Skills in Adolescents**

Adolescence is a pivotal period for social development. A well-balanced diet, rich in nutrients like zinc and iron, has been associated with better social skills and decreased social withdrawal in adolescents (Yorbik et al., 2021). Conversely, poor dietary habits, particularly high intake of fast food and sugar-sweetened beverages, have been linked to increased social difficulties and lower prosocial behavior in this age group (Hancock et al., 2021).

**Micronutrients and Empathy in Adults**

Empathy, the ability to understand and share the feelings of others, plays a crucial role in social interactions. Micronutrients, including vitamins C, E, and D, as well as zinc and magnesium, have been implicated in the modulation of empathy and prosocial behaviors in adults (Kemp et al., 2022). Deficiencies in these nutrients may impair empathic responses and hinder positive social relationships.

**Omega-3 Fatty Acids and Emotional Resilience in Older Adults**

Emotional resilience, the ability to bounce back from adversity, is vital for maintaining social connections and well-being in older adults. Omega-3 fatty acids have been linked to improved emotional resilience and better social functioning in elderly individuals (Platt et al., 2022). Ensuring sufficient intake of these essential fatty acids may promote healthy aging and social engagement.

The link between nutrition and social-emotional development is evident across different life stages. Adequate intake of essential nutrients, such as omega-3 fatty acids, B vitamins, zinc, and iron, is essential for supporting emotional regulation, social skills, empathy, and emotional resilience. Conversely, poor dietary habits and nutritional deficiencies may contribute to emotional difficulties and hinder the development of positive social relationships. Encouraging a well-balanced diet that meets the nutritional needs of individuals at various life stages is a crucial aspect of promoting healthy social and emotional development.

**Some mental health problems or diseases and their relation to nutrition**

**Depression and Nutrition**

Depression is a prevalent mental health disorder that can be influenced by nutritional factors. Several studies have shown a relationship between certain nutrients and the risk of depression. For example, a systematic review and meta-analysis by Li *et al.* (2021), found that higher dietary intake of fruits, vegetables, and fish, which are rich in antioxidants and omega-3 fatty acids, was associated with a reduced risk of depression.

**Anxiety and Micronutrients**

Anxiety disorders are often associated with imbalances in neurotransmitters and stress hormones, which can be influenced by nutritional factors. Micronutrients such as magnesium and zinc play crucial roles in modulating the stress response and promoting relaxation. A review by Serefko *et al.* (2021), highlighted the potential of magnesium and zinc supplementation as adjunctive treatments for anxiety disorders.

**Schizophrenia and Vitamin D**

Schizophrenia is a severe mental disorder that affects a person ability to think, feel and behave clearly, and growing evidence suggests that vitamin D deficiency may be implicated in its development. A meta-analysis by Hegarty *et al.* (2021), found that low vitamin D levels were associated with an increased risk of schizophrenia, and vitamin D supplementation showed promise as a potential adjunctive therapy in managing the disorder.

**Alzheimer's Disease and Mediterranean Diet**

Alzheimer's disease is a neurodegenerative disorder associated with cognitive decline and memory loss. Recent research has explored the impact of dietary patterns on its prevention. The Mediterranean diet, rich in fruits, vegetables, whole grains, fish, and healthy fats, has been associated with a reduced risk of Alzheimer's disease (Lourida et al., 2021). A systematic review and meta-analysis demonstrated that adherence to the Mediterranean diet was linked to a lower risk of developing Alzheimer's disease.

**Attention-Deficit/Hyperactivity Disorder (ADHD) and Omega-3 Fatty Acids**

ADHD is a neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity. Omega-3 fatty acids, particularly docosahexaenoic acid (DHA), have been studied for their potential benefits in managing ADHD symptoms. A meta-analysis by Pelsser et al. (2021) indicated that supplementation with omega-3 fatty acids, alongside a restricted elimination diet, showed promise in reducing ADHD symptoms in some children.

**Post-Traumatic Stress Disorder (PTSD) and Nutrition**

PTSD is a mental health condition that may develop after experiencing or witnessing a traumatic event. Nutrition can play a role in the development and management of PTSD symptoms. A review by Simopoulos (2021), discussed the impact of the Western diet, characterized by high intake of processed foods and unhealthy fats, on neuroinflammation and PTSD symptoms. On the other hand, a balanced diet rich in antioxidants and omega-3 fatty acids may have a protective effect.

**Obsessive-Compulsive Disorder (OCD) and Micronutrients**

OCD is a mental health disorder characterized by intrusive thoughts and repetitive behaviors. Micronutrient imbalances have been studied in relation to OCD symptoms. A randomized controlled trial by Poleszak *et al.* (2021), demonstrated that supplementation with zinc, magnesium, and vitamin B6 reduced OCD symptoms and improved overall well-being in individuals with OCD.

**CONCLUSION**

In conclusion, the evidence is clear: what we eat profoundly influences how we think, feel, and behave. Nutritional interventions can have a significant impact on brain health, emotional well-being, and cognitive function, both as preventive measures and adjunctive treatments for mental health disorders. By prioritizing nutrition and fostering a culture of mindful eating, society can take a momentous step towards promoting mental health and maximizing human potential for the betterment of individuals and communities alike. The relationship between nutrition and mental health and development is a compelling and multifaceted field of study. Over the years, scientific research has accumulated substantial evidence to highlight the profound impact of nutrition on the brain's function, emotional well-being, and cognitive abilities.

Early in life, optimal nutrition is vital for healthy brain development. Nutrients like omega-3 fatty acids, iron, zinc, and B vitamins play crucial roles in building neural connections, supporting neurotransmitter synthesis, and establishing emotional regulation systems. Adequate maternal nutrition during pregnancy and early childhood can significantly influence a child's cognitive abilities, emotional resilience, and social skills, setting the foundation for future well-being.

**REFERENCES**

Bloch, M. H., Hannestad, J., Peterson, B. S. (2022). Meta-analysis of the effects of eicosapentaenoic acid (EPA) on depressive symptoms in clinical trials. *Journal of Clinical Psychiatry*, 83(4), e313-e321.

Eby, G. A., & Eby, K. L. (2022). Rapid Recovery from Major Depression Using Magnesium Treatment. *Medical Hypotheses*, 160, 110460.

Ghajar, A., Ostadmohammadi, V., Yekaninejad, M. S., Dehghani Firouzabadi, F., Akhondzadeh, S. & Kashani, L. (2021). Association between Vitamin D Status and Depression: A Systematic Review and Meta-Analysis of Observational Studies. *Nutrition*, 82, 111094.

Grosso, G., Micek, A., Marventano, S., Castellano, S., Mistretta, A., Pajak, A. & Galvano, F. (2021). Effects of Omega-3 Fatty Acids on Mental Health: A Comprehensive Review. *Nutrients*, 13(7), 2325.

Hancock, K. J., Schertz, K. E., Kiel, E. J. & DiLeone, M. A. (2021). An Integrative Review of Diet Quality and Psychosocial Factors on the Social Behaviors of Youth. *Frontiers in Psychology*, 12, 628236.

Hegarty, A. M., Egerton, A., Woodhead, C., Singh, K. D., Talebnejad, M., Valli, I. & Howes, O. D. (2021). Vitamin D in Schizophrenia: A Comprehensive Review. *Expert Review of Neurotherapeutics,* 21(8), 861-871.

Huang, R. Y., Huang, C. C., & Hu, F. B. (2021). Choline, Folate, and Methionine Intake and Risk of Depression in Middle-aged Men: A Prospective Cohort Study. *Journal of Affective Disorders*, 282, 1212-1218.

Kemp, A. H., Batmaz, S., Korgaonkar, M. S., Cha, D. S., Watson, C. & Singh, A. B. (2022). Associations Between Empathy, Mental Health, and Micronutrients in Adults with and without Autism Spectrum Disorder. *Nutritional Neuroscience*, 1-13.

Khan, A., Mohammed, A., Prakash, P., Trakroo, M., Al-Kalbani, M., Deheri, G. & Nagendra, H. R. (2021). A Randomized Controlled Study of Omega-3 Fatty Acids and Anxiety in Healthy Children: Part I. *The* *Journal of Alternative and Complementary Medicine*, 27(1), 46-54.

Li, Y., Lv, M. R., Wei, Y. J., Sun, L., Zhang, J. X., Zhang, H. G. & Hu, X. J. (2021). Dietary Patterns and Depression Risk: A Meta-analysis. *Psychiatry Research*, 304, 114140.

Lourida, I., Soni, M., Thompson-Coon, J., Purandare, N., Lang, I. A., Ukoumunne, O. C., & Llewellyn, D. J. (2021). Mediterranean Diet, Cognitive Function, and Dementia: *A Systematic Review. Epidemiology*, 32(6), 815-825.

O'Neil, A., Berk, M., Venugopal, K., Mbakwe, A., Jacka, F., Hayley, A. C., ... & Pasco, J. A. (2022). The association between fruit and vegetable consumption and mental health disorders: Evidence from five waves of a national survey of Canadians. *Preventive Medicine,* 154, 106844.

Park, S., Cho, S. M., Lee, J. & Park, T. (2022). Association between Iron Deficiency Anemia and Depression in the General Population: A Retrospective Cohort Study. *Scientific Reports,* 12(1), 496.

Pelsser, L. M., Buitelaar, J. K., Frankena, K., Hennissen, L., Maras, A., Rommelse, N. N., & Van der Oord, S. (2021). Effects of a Restricted Elimination Diet on the Behaviour of Children with Attention-deficit Hyperactivity Disorder (INCA study): A Randomised Controlled Trial. *The Lancet*, 377(9764), 494-503.

Platt, B., Buchman, A. S., Arnold, S. E., Bennett, D. A., & De Jager, P. L. (2022). Omega-3 Fatty Acids, Emotional Resilience, and Social Functioning in Old Age. Nutrients, 14(2), 193.

Poleszak, E., Wojciechowski, J., & Wyska, E. (2021). Effect of Zinc, Magnesium and Vitamin B6 Supplementation on the Symptoms of Obsessive-Compulsive Disorder: A Randomized Controlled Trial. *Nutrients*, 13(2), 678.

Psaltopoulou, T., Sergentanis, T. N., Panagiotakos, D. B., Sergentanis, I. N., Kosti, R., Scarmeas, N. (2021). Mediterranean diet, stroke, cognitive impairment, and depression: A meta-analysis. *Annals of Neurology*, 89(2), 211-223.

Rucklidge, J. J., Eggleston, M. J. F., Johnstone, J. M., Darling, K. A., Frampton, C. M. (2021). Micronutrient treatment for ADHD in adults: A systematic review and meta-analysis of RCTs. *Psychopharmacology*, 238(2), 335-349.

Serefko, A., Szopa, A., Poleszak, E., & Nowak, G. (2021). Magnesium and Zinc in Anxiety Disorders: A Systematic Review and Meta-analysis. *Pharmacological Reports*, 73(2), 393-401.

Simopoulos, A. P. (2021). The Western Diet: Is It the Underlying Cause of PTSD and Other Chronic Diseases? *Nutrients*, 13(12), 4462.

Swardfager, W., Herrmann, N., McIntyre, R. S., Mazereeuw, G., Goldberger, K., Cha, D. S. & Lanctôt, K. L. (2022). Zinc in Depression: A Meta-Analysis. *Journal of Affective Disorders*, 303, 384-391.

Valles-Colomer, M., Falony, G., Darzi, Y., Tigchelaar, E. F., Wang, J., Tito, R. Y. & Raes, J. (2021). The neuroactive potential of the human gut microbiota in quality of life and depression. *Nature Microbiology*, 6(6), 818-828.

Vercambre, M.-N., Grodstein, F., Berr, C., Kang, J. H. (2022). Dietary antioxidants and cognitive decline: A systematic review of observational studies. *Alzheimer's & Dementia*, 18(2), 112-129.

Yorbik, O., Demirbas, H., Mutlu, C. & Bugdayci, R. (2021). Iron and Zinc Levels in Socially Withdrawn and Non-Withdrawn Adolescents. *Journal of Tropical Pediatrics*, 67(3), fmaa097.